PRESENT STATUS OF FLORISTIC DIVERSITY OF MOTHRONWALA SWAMP FOREST OF DOON VALLEY [1]

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Doon Valley has many freshwater swamps, due to its unique topography and peculiar situation in the foothills of the Himalaya. One such swamp is Mothronwala Freshwater Swamp, where the present study was carried out. It occurs as a compact area between 30° 15' N and 78° 2' E, with an average altitude of 600 m above msl. In this paper, we have attempted to study the structure of the vegetation of Mothronwala Swamp. Dakshini (1970, 1974) had reported 356 species of flowering plants with 261 genera and 71 families from this Swamp. The Mothronwala Swamp Forest was resurveyed after four decades and a number of changes were recorded in its vegetation. There is a decline in number of species; only 278 species of flowering plants in 218 genera and 71 families were recorded during the present study (2002-2003).

Key words: Doon Valley, floristic diversity, Mothronwala, swamp

INTRODUCTION

Freshwater swamps are locally known as *oogals* and are dominated by unique plant species. They often have standing water for most of the growing seasons (Mitsch and Gosselink 1986). Swamps and marshes are considered as the source of mosquitoes that cause malaria. However, swamps are known to absorb toxic chemicals and even clean up polluted water as in natural treatment plants (NTPs). Swamp forests are an integral part of wetland ecosystems, serving as habitats, spawning areas and sources of food for many organisms (Brown *et al.* 1979; Wharton and Brinson 1979). Indian freshwater swamps are found along the sub-montane tract of the Himalaya. These generally occur along the banks of terai streams in the outer range of the Himalaya up to an elevation of 2,580 m.

References to the Mothronwala Fresh Water Swamp are found in the flora of the upper Gangetic plain, and the adjacent Siwalik and sub-Himalayan Tracts by Duthie (1903-1922) and 'Herbaceous flora of Doon' by Babu (1977). The flora of Chakrata, Dehradun and Saharanpur divisions has been studied by Kanjilal (1901). In Doon Valley, the freshwater swamps occur as localised habitats that have come up as a result of special topography, where water oozes out in perennial streams and sub-soil water maintains a constant level throughout the year above the surface of the soil (Dakshini 1968). This results in a unique wetland ecosystem with vegetation entirely different from the surrounding area. However, the urban expansion of the valley has led to continuous encroachment of forestland, and swamps are no exception. Presently, only a few small and scattered patches of swamps are left between the base of the outer hills of the Himalaya in the north and the Siwalik Hills in the south. Among these, Mothronwala is the most accessible nearest and among the most important swamp forests of Doon valley.

Mothronwala Freshwater Swamp Forest used to possess a peculiar floristic diversity due to its topographic and edaphic variation. The forest of this region has depleted during the last four decades due to its exploitation for fuel, food, fodder and timber. The Mothronwala Swamp Forest has experienced very high pressure, and a lot of changes have been recorded in the vegetation of the Swamp.

Som and Aswal (1974) have studied the vegetation of Mothronwala Freshwater Swamp, apart from the detailed study on the vegetation of the swamp conducted by Dakshini (1960a, b, 1965, 1968, 1970, 1974). The present paper attempts to re-explore the floristic diversity of Mothronwala Swamp and compare it with Dakshini (1970 and 1974).

MATERIAL AND METHODS

Doon Valley is located between 29° 30'-30° 32' N and 77° 39'-78° 18' E in Uttarakhand, India. The present study was conducted during 2002-2003 in the Mothronwala Freshwater Swamp Forest (Fig. 1). Care was taken to re-survey the areas surveyed by Dakshini (1960). The usual methods of collection, preservation and maintenance of specimens in herbarium were followed (Jain and Rao 1977). A total of 42 trips was made for collection in different seasons. During the field study, specimens of plants with flower and fruit were recorded. Collections of plant species were made throughout the year. The field data namely the habit, habitat, flower colour and vernacular name of each taxon were recorded.

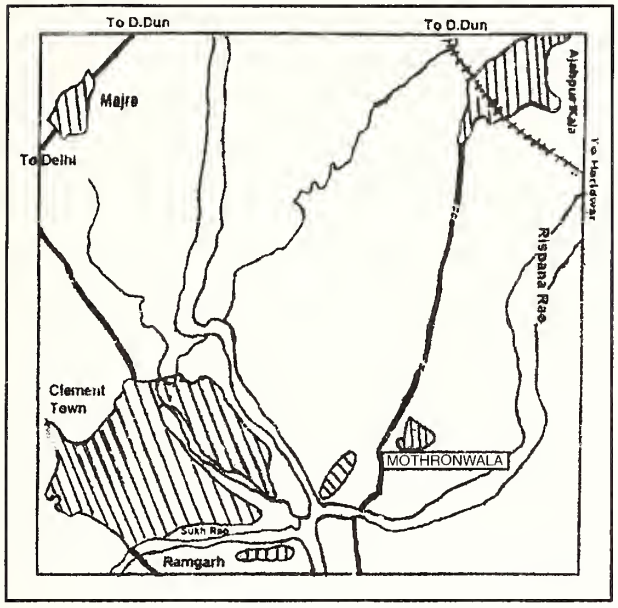

Fig. 1: Location map of study area

After collection, the specimens were processed, preserved and mounted on herbarium sheets. The herbarium sheets were identified in the BSD Herbarium and deposited in the Herbarium of the Ecology Research Laboratory, Botany Department, D.A.V. (P.G.) College, Dehradun. The descriptions of plants in the available literature were studied (Gaur 1999; Babu 1977). All plant species are arranged according to Bentham and Hooker's system of classification.

RESULTS AND DISCUSSION

During the study, 278 species of angiosperms in 218 genera and 71 families were collected from the study site. Out of 278 species, 219 species in 173 genera are Dicotyledons, and 59 species in 45 genera are Monocotyledons. The floristic diversity of Mothronwala fresh water Swamp Forest during the study period 2002-2003 is presented in (Table 1).

Dakshini (1970, 1974) reported 356 species of flowering plants belonging to 261 genera and 71 families. Sixty families represented dicots of 201 genera and 276 species. A total of 11 families of monocots had 60 genera and 80 species (Table 2).

Fabaceae and Asteraceae are the dominant families of dicots. Family Fabaceae includes the largest number of species (30) and genera (20); Asteraceae includes (26) species and (21) genera. Dakshini (1960a, 1974) also reported Fabaceae and Asteraceae as the dominant families of dicots. Comparison of dominant genera and species of various families of dicots in Mothronwala Freshwater Swamp is shown in (Fig. 2). Among the monocots, Family Poaceae is dominated with 28 genera and 34 species followed by Cyperceae with 4 genera and 12 Species (Fig. 3).

Dakshini (1965) reported 38 tree, 52 shrub, 42 climber and 235 herb species. The present study indicates that the forest of this region has depleted at a very fast rate during the last four decades. Presently, the vegetation structure of the swamp is 25 tree, 34 shrub, 25 climber and 194 herb species (Table 3). A clear decline of 13 tree, 18 shrub, 17 climber, and 41 herb species is evident from the vegetation structure.

The dominant families of the present study are Fabaceae, Asteraceae, Poaceae, Cyperaceae, Scrophulariaceae and Convolvulaceae. A comparison of a number of taxa recorded by Dakshini and in the present study are presented in Table 4. Fourteen new families which includes 4 species of trees and 11 species of herbs, have been recorded from the Mothronwala Freshwater Swamp (Table 5).

Table 6 indicates the plant species of Mothronwala Swamp reported by Dakshini (1970, 1974), but absent in the present area. A very common tree species of Doon valley swamps

Table 1: Floristic diversity of Mothronwala Freshwater Swamp during the study period (2002-2003)

Groups	Family	Genera	Species
Dicotyledons	60	173	219
Monocotyledons	11	45	59
Total	71	218	278

Table 2: Comparison of families, genera and species of angiosperms of Mothronwala Freshwater Swamp

Groups	Families		Genera		Species	
	D	P	D	P	D	P
Dicotyledons	60	60	201	173	276	219
Monocotyledons	11	11	60	45	80	59
Total	71	71	261	218	356	278

D = Dakshini; P = Present work

Table 3: Comparison of the vegetation structure of the Swamp

Life-forms	Dakshini	Present work
Herbs	235	194
Shrubs	52	34
Climbers	42	25
Trees	38	25

Table 4: Comparison of number of genera and species reported in the present study and by Family in Dakshini

Family	Dakshini		Present work		Family	Dakshini		Present work	
	Genera	Species	Genera	Species		Genera	Species	Genera	Species
Ranunculaceae	2	2	2	4	Primulaceae	2	2	2	2
Papaveraceae	-	-	1	1	Myrsinaceae	1	1	1	1
Menispermaceae	3	3	1	1	Ebenaceae	1	1	-	-
Fumariaceae	-	-	1	1	Oleaceae	1	1	1	1
Brassicaceae	2	2	4	4	Apocynaceae	6	6	3	3
Capparaceae	1	1	1	1	Asclepiadaceae	1	1	1	1
Cleomaceae	-	-	1	1	Boraginaceae	4	4	3	5
Violaceae	1	1	1	1	Ehertiaceae	1	2	1	1
Bixaceae	1	1	1	1	Convolvulaceae	3	7	2	10
Polygalaceae	1	1	-	-	Solanaceae	3	5	5	7
Caryophyllaceae	-	-	2	2	Scrophulariaceae	7	11	6	10
Dipterocarpaceae	1	1	-	-	Pedaliaceae	1	1	1	1
Malvaceae	5	7	6	8	Acanthaceae	10	13	8	9
Bombacaceae	1	1	1	1	Verbenaceae	7	10	8	9
Sterculiaceae	3	3	2	2	Lamiaceae	10	13	7	8
Tiliaceae	3	4	3	4	Nyctaginaceae	1	1	1	1
Linaceae	1	1	1	1	Amaranthaceae	5	6	5	5
Malpighiaceae	1	1	-	-	Chenopodiaceae	-	-	1	1
Geraniaceae	1	1	1	1	Polygonaceae	1	4	2	4
Oxalidaceae	1	1	1	2	Piperaceae	-	-	1	1
Rutaceae	5	6	4	4	Lauraceae	3	5	1	1
Burseraceae	1	1	-	-	Proteaceae	-	-	1	1
Meliaceae	1	1	2	2	Elagenaceae	1	1	-	-
Celastraceae	1	1	-	-	Euphorbiaceae	7	10	5	5
Rhamnaceae	4	4	2	2	Urticaceae	8	17	4	4
Vitaceae	2	2	1	1	Moraceae	-	-	2	3
Leeaceae	1	2	1	1	Ulmaceae	-	-	1	1
Sapindaceae	1	1	-	-	Fagaceae	-	-	1	1
Sabiaceae	1	1	-	-	Salicaceae	1	1	-	-
Anacardiaceae	1	1	1	1	Orchidaceae	4	5	-	-
Fabaceae	25	51	20	30	Musaceae	-	-	1	1
Rosaceae	3	3	4	4	Zingiberaceae	6	7	2	2
Myrtaceae	2	2	1	1	Cannaceae	-	-	1	1
Melastomataceae	1	1	-	-	Hypoxidaceae	1	1	-	-
Lythraceae	3	4	-	-	Amaryllidaceae	-	-	2	2
Passifloraceae	1	1	1	2	Dioscoreaceae	1	3	1	1
Cucurbitaceae	3	3	3	5	Liliaceae	4	4	2	2
Aizoaceae	-	-	1	1	Commelinaceae	3	5	2	2
Apiaceae	1	1	1	1	Juncaceae	1	1	-	-
Araliaceae	1	1	-	-	Arecaceae	1	1	1	1
Cornaceae	-	-	1	1	Araceae	3	3	1	1
Rubiaceae	7	8	4	4	Cyperaceae	5	13	4	12
Asteraceae	23	26	21	26	Poaceae	30	37	28	34
Plumbaginaceae	1	1	1	1	Total	261	356	218	278

Bischofia javanica, reported by Kanjilal (1901) and Dakshini (1970, 1974), was not recorded during the present study. Dakshini (1970, 1974) reported 356 species of angiosperms, out of which 238 species were not found during the present study. Similarly, 135 new plant species reported during the present study, were not reported by Dakshini (1970, 1974) (Table 7).

CONCLUSION

Local extinction of 211 plant species and immigration of 135 tolerant, opportunistic species in the last three decades can be due to the fact that Mothronwala Freshwater Swamp has witnessed a continued increase in human population due to various reasons; namely its proximity to the expanding

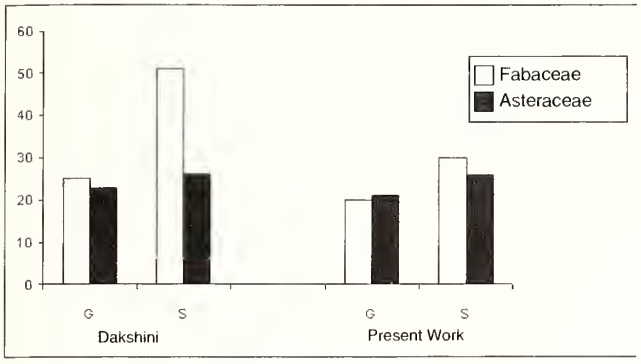

Fig. 2: Comparison of dominant dicot genera (G) and species (S) of Mothronwala Freshwater Swamp

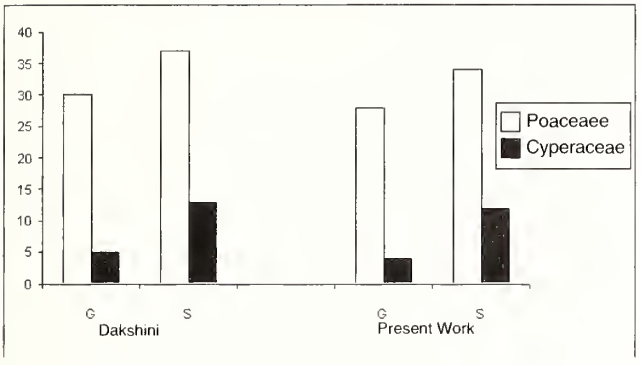

Fig. 3: Comparison of dominant monocot genera (G) and species (S) of Mothronwala Freshwater Swamp

Dehradun city, fear of swamp as a disease source, drainage of swampy water for drinking water requirements, farming on encroached forest lands, urbanization on its periphery and unmindful destruction of forest wealth by peripheral villagers for various wood and non-wood products.

Table 5: New families reported from Mothronwala Swamp

Family	Plant species
Cannaceae	*Canna indica* Linn.
Ulmaceae	*Celtis australis* Linn.
Chenopodiaceae	*Chenopodium album* Linn.
Cleomaceae	*Cleome viscosa* Linn.
Cornaceae	*Cornus oblonga* Wallich.
Amaryllidaceae	*Crinum defixum* Ker-Gawler
Fumariaceae	*Fumaria parviflora* Lamk.
Porteaceae	*Grevillea robusta* A. Cunn.
Aizoaceae	*Mollugo pentaphylla* Linn.
Musaceae	*Musa balbisiasna* Colla
Piperaceae	*Peperomia pellucida* (Linn.) HBK
Fagaceae	*Quercus leucotrichophora* A. Camus
Caryophyllaceae	*Silene conoidea* Linn.
	Stellaria media (Linn.) Vill.
Amaryllidaceae	*Zephyranthes grandiflora* Lindley

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Table 6: Plants reported by Dakshini but absent in the present study

Plant spp.	Family	Plant spp.	Family
Cocculus laurifolius DC.	Menispermaceae	*Acer oblongum* Wall. ex DC.	Sapindaceae
Tinospora glabra (Burm.f.) Merill	Menispermaceae	*Sabia paniculata* Edgew ex Hook.f. &Thoms.	Sabiaceae
Polygala crotalarioides Buch.-Ham.	Polygalaceae	*Lannea coromandelica* (Houtt.) Merrill.	Anacardiaceae
Shorea robusta Gaertn.	Dipterocarpaceae	*Abrus fruticulosus* Wall ex Wight & Arn.	Fabaceae
Abelomoschus crinitus Wall.	Malvaceae	*Acacia farnesiana* Willd.	Fabaceae
Sida acuta Burm.f.	Malvaceae	*Aeschynomene indica* Linn.	Fabaceae
Salmalia malabarica (DC.) Schott & Endl.	Bombacaceae	*Albizzia stipulata* Boiv. var. *smithana* Prain	Fabaceae
Melochia corchorifolia Linn.	Sterculiaceae	*Alysicarpus bupleurifolius* (Linn.) DC.	Fabaceae
Sterculia villosa Roxb.	Sterculiaceae	*Alysicarpus glumaceus* (Vahl.) DC.	Fabaceae
Grewia disperma Rottl. ex Spreng.	Tiliaceae	*Alysicarpus vaginalis* (Linn.) DC.	Fabaceae
Grewia polygama Roxb.	Tiliaceae	*Butea monosperma* (Lamk.) Taub	Fabaceae
Hiptage bengalensis (Linn.) Kurz	Malpighiaceae	*Butea parviflora* Roxb. ex DC.	Fabaceae
Acronychia pedunculata (Linn.) Miq.	Rutaceae	*Cassia leschenaultiana* DC.	Fabaceae
Murraya paniculata (Linn.) Jack.	Rutaceae	*Cassia occidentalis* Linn.	Fabaceae
Garuga pinnata Roxb.	Burseraceae	*Crotalaria albida* Heyne ex Roth.	Fabaceae
Celastrus paniculata Willd.	Celastraceae	*Crotalaria calycina* Schrank.	Fabaceae
Rhamnus virgata Roxb.	Rhamnaceae	*Crotalaria ferruginea* R. Grah. ex Benth.	Fabaceae
Ventilago denticulata Willd.	Rhamnaceae	*Crotalaria sericea* Retz.	Fabaceae
Vitis parviflora Roxb.	Vitaceae	*Crotalaria sessiliflora* Linn.	Fabaceae
Leea alata Edgeworth	Leeaceae	*Crotalaria prostrata* Rottl. ex Willd.	Fabaceae
Leea edgeworthii Santapau	Leeaceae	*Desmodium motorium* (Houtt.) Merrill	Fabaceae

Table 6: Plants reported by Dakshini but absent in the present study (*contd.*)

Plant spp	Family	Plant spp	Family
Desmodium retusum (D.Don) Swert.	Fabaceae	*Cryptolepis buchananii* Roem. & Schult.	Asclepiadaceae
Desmodium triquetrum (Linn.) DC.	Fabaceae	*Bothriospermum tenellum* Fisch. & Mey.	Boraginaceae
Indigofera atropurpurea Buch.-Ham. ex Roxb.	Fabaceae	*Cordia dichotoma* Forst.f.	Boraginaceae
Indigofera glandulosa Willd.	Fabaceae	*Cynoglossum meeboldii* Brand.	Boraginaceae
Millettia auriculata Baker	Fabaceae	*Argyreia thomsoni* (Clarke) Craib.	Convolvulaceae
Moghania bracteata (Roxb.) Linn.	Fabaceae	*Ipomoea dichroa* (Roem & Schult) Choisy	Convolvulaceae
Moghania prostrata (Roxb.f.) Mukerjee	Fabaceae	*Ipomoea thomsoni* (Clarke) Craib.	Convolvulaceae
Moghania semialata (Roxb.) Mukerjee	Fabaceae	*Rivea ornata* Choisy.	Convolvulaceae
Mucuna prurita Hook.	Fabaceae	*Cestrum nocturnum* Linn.	Solanaceae
igna umbellata (Thunb.) Ohwi & Ohashi	Fabaceae	*Solanum indicum* Linn.	Solanaceae
Pueraria phaseoloidea Benth.	Fabaceae	*Centranthera nepalensis* D. Don	Scrophulariaceae
Rhynchosia rothii Benth. ex Altchison	Fabaceae	*Lindernia anagalis* (N.L. Burm.) Pennell	Scrophulariaceae
Sesbania sesban (Linn.) Merrill	Fabaceae	*Lindernia ciliata* (Colsmann) Penell	Scrophulariaceae
Tephrosia candida DC.	Fabaceae	*Lindernia cordifolia* (Colsmann) Merill	Scrophulariaceae
Uraria picta Desv.	Fabaceae	*Lindernia hookeri* (Clarke) Wettstt.	Scrophulariaceae
Uraria rufescens (DC.) Schindl.	Fabaceae	*Limnophila rugosa* (Roth) Merrill	Scrophulariaceae
Vigna capensis (L.) Walp.	Fabaceae	*Mimulus strictus* Benth.	Scrophulariaceae
Zorina gibbosa Span.	Fabaceae	*Torenia cordifolia* Roxb.	Scrophulariaceae
Syzygium cerasoides (Roxb.) Raizada	Myrtaceae	*Veronica anagallis aquatica* Linn.	Scrophulariaceae
Sonerilla tenera Royle	Melastomataceae	*Sesamum orientale* Linn.	Pedaliaceae
Ammannia baccifera Linn.	Lythraceae	*Hygrophila polysperma* (Roxb.) T. Anders.	Acanthaceae
Rotala mexicana Cham. & Schlect	Lythraceae	*Hygrophila salicifolia* (Vahl.) Nees	Acanthaceae
Rotala rotundifolia Koehne.	Lythraceae	*Hemigraphis latebrosa* Nees	Acanthaceae
Woodfordia fruticosa (Linn.) Kurz.	Lythraceae	*Rungia pectinata* (Linn.) Nees	Acanthaceae
Cucumis melo Naud.	Cucurbitaceae	*Clerodendrum indicum* (Linn.) Kuntze	Verbenaceae
Mukia maderaspatana (Linn.)	Cucurbitaceae	*Clerodendrum serratum* (Linn.) Moon	Verbenaceae
Schefflera venulosa (Wt. & Arn.) Harms	Araliaceae	*Lantana crenulata* Otto & Dietr.	Verbenaceae
Borreria articularis (Linn.f.) F.N. Williams	Rubiaceae	*Premna herbacea* (Roxb.)	Verbenaceae
Borreria ocymoides DC.	Rubiaceae	*Acrophalus indicus* (Burm.)	Lamiaceae
Knoxia corymbosa Willd.	Rubiaceae	*Ajuga bracteosa* Wall. ex Benth.	Lamiaceae
Oldenlandia corymbosa Linn.	Rubiaceae	*Colebrookia oppositifolia* Smith	Lamiaceae
Pavetta tomentosa Roxb. ex Rees.	Rubiaceae	*Leucas lanata* Benth.	Lamiaceae
Rubia cordifolia Linn.	Rubiaceae	*Leucas nutans* Spreng.	Lamiaceae
Adenostemma lavenia (Linn.) O. Kuntze	Asteraceae	*Mosla dianthera* (Buch.-Ham. ex Roxb.) Maxim.	Lamiaceae
Adenostemma viscosum J.R. & G. Forster	Asteraceae	*Nepeta graciliflora* Benth.	Lamiaceae
Artemisia nilagirica (Clarke) Pamp.	Asteraceae	*Orthosiphon rubicundus* Benth.	Lamiaceae
Blumea lanceolaria (Roxb.) Druce	Asteraceae	*Plectranthus japonicus* (Burm.f.) Koidz.	Lamiaceae
Cirsium wallichii DC.	Asteraceae	*Teucrium stoloniferum* Roxb.	Lamiaceae
Conyza japonica Lees.	Asteraceae	*Achyranthus bidentata* Blume.	Amaranthaceae
Crepis acaulis (DC.) Hook.f.	Asteraceae	*Amaranthus spinosus* Linn.	Amaranthaceae
Cyathocline purpurea (D. Don) Kuntze.	Asteraceae	*Celosia argentea* Linn.	Amaranthaceae
Echinops cornigerus DC.	Asteraceae	*Polygonum stagninum* Buch.-Ham. ex Meisn	Polygonaceae
Eclipta prostrata (Linn.) Linn.	Asteraceae	*Machilus gamblei* King ex Hook.f.	Lauraceae
Gnaphalium indicum Linn.	Asteraceae	*Persea gamblei* (King ex Hook.f.) Kosterm.	Lauraceae
Inula cappa (Buch.-Ham. ex D. Don) DC.	Asteraceae	*Persea odoratissima* (Nees) Kostermans	Lauraceae
Tricholepis stictophylla Clarke	Asteraceae	*Phoebe lanceolata* Nees	Lauraceae
Vicoa indica (Linn.) DC.	Asteraceae	*Elaeganus conferta* Roxb.	Elagenaceae
Wedelia wallichii Less	Asteraceae	*Antidesma diandrum* Roth.	Euphorbiaceae
Xanthium strumarium Linn.	Asteraceae	*Baliospermum montanum* (Willd.) Muell-Arg	Euphorbiaceae
Youngia japonica (Linn.) DC.	Asteraceae	*Bischofia javanica* Blume	Euphorbiaceae
Diospyros montana Roxb.	Ebenaceae	*Euphorbia hypercifolia* Linn.	Euphorbiaceae
Carissa opaca Stapf. ex Haines.	Apocynaceae	*Euphorbia dracunculoides* Lam.	Euphorbiaceae
Rauwolfia serpentina Benth. ex Kuntze	Apocynaceae	*Phyllanthus virgatus* J.G. Forst	Euphorbiaceae
Tabernaemontana divaricata (Linn.) R.Br. ex & Schult.	Apocynaceae	*Boehmeria platyphylla* D. Don.	Urticaceae
Trachelospermum lucidum (D. Don) K. Schum.	Apocynaceae	*Cudrania javanensis* Trecul.	Urticaceae

Table 6: Plants reported by Dakshini but absent in the present study (*contd.*)

Plant spp	Family	Plant spp	Family
Elatostema cuneatum Wight	Urticaceae	*Remusatia vivipara* Schott	Araceae
Ficus gibbosa Blume var. *cuspidifera* Miq.	Urticaceae	*Cyperus pilosus* Vahl	Cyperaceae
Ficus auriculata Lour.	Urticaceae	*Carex fedia* Nees	Cyperaceae
Ficus arnottiana Miq.	Urticaceae	*Cyperus kyllingia* Endl.	Cyperaceae
Ficus hederacea Roxb.	Urticaceae	*Scleria levis* Retz.	Cyperaceae
Ficus hispida Linn.f.	Urticaceae	*Scleria tessellata* Willd.	Cyperaceae
Ficus racemosa Linn.	Urticaceae	*Scirpus erectus* Poir.	Cyperaceae
Ficus rumphii Blume	Urticaceae	*Anthraxon lancifolius* (Trin.) Hochst.	Poaceae
Ficus semicordata Buch.-Ham.	Urticaceae	*Anthraxon prionodes* (Steud.) Dandy	Poaceae
Salix tetrasperma Roxb.	Salicaceae	*Arundinella nepalensis* Trin.	Poaceae
Eulophia flava (Lindl. ex Royle) Hook.f.	Orchidaceae	*Arundo donax* Linn.	Poaceae
Zeuxine strateumataica (Linn.) Schlechter	Orchidaceae	*Chionachne koinigii* (Spreng.) Thw.	Poaceae
Habenaria commelinifolia Wall.	Orchidaceae	*Chrysopogon fulvus* (Spreng.) Chiovenda.	Poaceae
Habenaria diphylla Dalz.	Orchidaceae	*Cyrtococcum patens* (Linn.) A. Camus	Poaceae
Peristylus lawii Wight	Orchidaceae	*Digitaria adscendens* (Kunth) Henrad	Poaceae
Alpinia bracteata Roxb.	Zingiberaceae	*Eragrostis gangetica* (Roxb.) Steud.	Poaceae
Curcuma longa Linn.	Zingiberaceae	*Elusine coracana* (Linn.) Gaertn.	Poaceae
Costus speciosus Smith	Zingiberaceae	*Eragrostis tenella* (Linn.) P. Beauv. ex Roem.et Schult.	Poaceae
Curcuma angustifolia Roxb.	Zingiberaceae		
Hedychium coronarium Koen. ex Retz.	Zingiberaceae	*Hemarthria compressa* (Linn. f.) R.Br.	Poaceae
Curculigo orchioides Gaertn.	Hypoxidaceae	*Narenga porphyrocoma* (Hance) Bor.	Poaceae
Dioscorea belophylla Voiget.	Dioscoreaceae	*Pennisetum orientale* L.C. Rich.	Poaceae
Dioscorea pentaphylla Linn.	Dioscoreaceae	*Phragmites communis* Trin. var. *communis* Bor.	Poaceae
Gagea reticulata Schultes f.	Liliaceae		
Gloriosa superba Linn.	Liliaceae	*Polypogon monspeliensis* (Linn.) Defontaines	Poaceae
Smilax glaucophylla Klotzsch.	Liliaceae		
Commelina paludosa Blume	Commelinaceae	*Pseudosorghum fasciculare* (Roxb.)	Poaceae
Floscopa scandens Lour.	Commelinaceae	*Rottboellia exaltata* Linn.f.	Poaceae
Murdania scapiflorum (Roxb.) Royle	Commelinaceae	*Setaria plicata* (Lamk.) T. Cooke	Poaceae
Juncus bufonius Linn.	Juncaceae	*Sorghum halepense* (Linn.) Pers.	Poaceae
Arisaema tortuosum (Wallich) Schott	Araceae	*Themeda arundinacea* (Roxb.) Ridley	Poaceae

Table 7: New plant species in the study area

Plant species	Family	Plant species	Family
Ranunculus arvensis Linn.	Ranunculaceae	*Mangifera indica* Linn.	Anacardiaceae
Ranunculus muricata Linn.	Ranunculaceae	*Albizia mollis* Boivin.	Fabaceae
Argemone mexicana Linn.	Papaveraceae	*Alysicarpus rugosus* (Willd.) DC.	Fabaceae
Fumaria parviflora Lam.	Fumariaceae	*Bauhina variegata* Linn.	Fabaceae
Brassica juncea (L.) Czern. &. Coss.	Brassicaceae	*Casia obtusifolia* Linn.	Fabaceae
Capsella bursa pestoris (Linn.) Medikus	Brassicaceae	*Crotolaria spectabilis* Lamk.	Fabaceae
Cleome viscosa Linn.	Cleomaceae	*Desmodium gyrans* (Linn.f.) DC.	Fabaceae
Silene conoidea Linn.	Caryophyllaceae	*Fleminigia strobilifera* (Linn.) R.Br.	Fabaceae
Stellaria media (Linn.) Villars	Caryophyllaceae	*Lespideza juncea* Pers.	Fabaceae
Malvastrum coromandelicum (Linn.) Gracke	Malvaceae	*Melilotus indica* (Linn.) Allioni	Fabaceae
Sida cordifolia Linn.	Malvaceae	*Millettia externsa* (Benth.) Baker	Fabaceae
Sida rhombifolia Linn. emend. Mast.	Malvaceae	*Mimosa pudica* Linn.	Fabaceae
Bombax ceiba Linn.	Bombacaceae	*Phaseolus avernus* Roxb.	Fabaceae
Pterospermum acerifolium (Linn.) Willd.	Sterculiaceae	*Phaseolus mungo* Linn.	Fabaceae
Corchorus olitorius Linn.	Tiliaceae	*Vicia sativa* Linn.	Fabaceae
Grewia optiva J.R. Drummond ex Burret	Tiliaceae	*Vigna unguiculata* (Linn.) Walp.	Fabaceae
Oxalis debilis Humb.	Oxalidaceae	*Rosa macrophylla* Lindley.	Rosaceae
Melia azadirach Linn.	Meliaceae	*Passiflora suberosa* Linn.	Passifloraceae
Leea aspera Edgew.	Leeaceae	*Cucumis sativus* Linn.	Cucurbitaceae

Table 7: New plant species in the study area (*contd.*)

Plant species	Family	Plant species	Family
Momordica charantia Linn.	Cucurbitaceae	*Veronica salina* Schur.	Scrophulariaceae
Trichosanthes cordata Roxb.	Cucurbitaceae	*Sesamum orientale* Linn.	Pedaliaceae
Trichosanthes cucumeria Linn.	Cucurbitaceae	*Rungia parviflora* (Retz.) Nees	Acanthaceae
Mollugo pentaphylla Linn.	Aizoaceae	*Rungia repens* (Linn.) Nees	Acanthaceae
Cornus oblonga Wallich.	Cornaceae	*Clerodendron siphoranthus* R.Br.	Verbenaceae
Galium asperifolium Wallich.	Rubiaceae	*Duranta repens* Linn.	Verbenaceae
Oldenlandia cocinea (Royle) Hook.f.	Rubiaceae	*Vitex negundo* Linn.	Verbenaceae
Randia tetraspermea (Roxb.) Benth. & Hook.f.	Rubiaceae	*Leucas cephalata* (Roth.) Spreng.	Lamiaceae
Ageratum houstonianum Mill.	Asteraceae	*Mentha piperita* Linn.	Lamiaceae
Artemisia parviflora Buch.-Ham. ex D. Don	Asteraceae	*Perilla frutescens* (Linn.) Britt.	Lamiaceae
Artemisia rouxburghiana Wallich ex Besser	Asteraceae	*Plectranthus coetsa* Buch.-Ham.ex D.Don	Lamiaceae
Cichorium intybbus Linn.	Asteraceae	*Salvia plebbia* R. Br.	Lamiaceae
Cnicus arvensis (Linn.) Hoffm.	Asteraceae	*Amaranthus viridis* Linn.	Amaranthaceae
Cnicus wallichii (DC.) Hook.f.	Asteraceae	*Chenopodium album* Linn.	Chenopodiaceae
Dicrocephala latifolia DC.	Asteraceae	*Rumex dentatus* Linn.	Polygonaceae
Eclipta alba (Linn.) Hassk.	Asteraceae	*Peperomia pellucida* (Linn.) Kunth	Piperaceae
Enhydra fluctuans Lour.	Asteraceae	*Listea monopetala* (Roxb.) Pers.	Lauraceae
Eupatorium adenophorum Sprengel.	Asteraceae	*Grevillea robusta* A. Cunn	Proteaceae
Galinsoga ciliata (Rafinesque-Schmatz)	Asteraceae	*Ricinus communis* Linn.	Euphorbiaceae
Lauanea nudicaulis (Linn.) Hook.f.	Asteraceae	*Celtis australis* Linn.	Ulmaceae
Saussurea heteromalla (D. Don) Hand-Mazz	Asteraceae	*Quercus leucotrichophora* A. Camus	Fagaceae
Synedrella vialis (Lees) A. Gray	Asteraceae	*Musa balbisiasna* Colla	Musaceae
Taraxacum officinale Weber	Asteraceae	*Canna indica* Linn.	Cannaceeae
Vernonia anthelmintica (Linn.) Willd.	Asteraceae	*Crinum defixum* Ker-Gawler	Amaryllidaceae
Xanthium indicum Koenig.	Asteraceae	*Zephyranthes grandiflora* Lindley	Amaryllidaceae
Carissa congesta Wight	Apocynaceae	*Smilax zeylanica* Linn.	Liliaceae
Marsdenia roylei Wight	Asclepiadaceae	*Cyperus brevifolius* (Rottb.) Hassk	Cyperaceae
Cynoglossum lanceolotum Forsk.	Boraginaceae	*Cyperus compressus* Linn.	Cyperaceae
Cynoglossum wallichii G. Don	Boraginaceae	*Carex wallichiana* Presc.	Cyperaceae
Cynoglossum zeylanicum (Vahl. ex Hornem).	Boraginaceae	*Fimbristylis bisumbellata* (Forsk.) Bub.	Cyperaceae
		Sciprus supinus Linn.	Cyperaceae
Evolvulus alsinodes (Linn.) Linn.	Convolvulaceae	*Avena sativa* Linn.	Poaceae
Evolvulus nummularius (Linn.) Linn.	Convolvulaceae	*Bambusa arundinacea* Willd.	Poaceae
Ipomoea carnea Jacquin Enum.	Convolvulaceae	*Chrysopogon aculatus* (Retz.) Trin.	Poaceae
Ipomoea cairica (Linn.) Sweet	Convolvulaceae	*Chrysopogon montanus* (Retz.)Trin.	Poaceae
Ipomoea quamoclit Linn.	Convolvulaceae	*Cynodon dactylon* (Linn.) Pers.	Poaceae
Ipomoea nil (Linn.) Roth	Convolvulaceae	*Cyrtococcum accrescens* (Trin.) Stapf.	Poaceae
Ipomoea purpurea (Linn.) Roth	Convolvulaceae	*Digitaria biformis* Willd.	Poaceae
Datura alba Nees	Solanaceae	*Ergrastosis japonica* (Thunb) Trinius	Poaceae
Nicotiana plumbaginifolia Viviani	Solanaceae	*Paspalum distichum* Linn.	Poaceae
Petunia violaceae Lindl.	Solanaceae	*Paspalidum flavidum* (Retz.) A. Camus	Poaceae
Solanum xanthocarpum Schard. & Wendl.	Solanaceae	*Phragmetis karka* (Retz.)Trinius ex Steudel.	Poaceae
Bacopa procumbens (Miller) Greenman	Scrophulariaceae	*Poa annua* Linn.	Poaceae
Lindenbergia indica (Linn.) O. Kuntze	Scrophulariaceae	*Polypogon fugax* Nees ex Steud.	Poaceae
Mazus delavayi Bonati.	Scrophulariaceae	*Setaria tomentosa* (Roxb.) Kunth.	Poaceae
Mazus pumilus (Burm.f.) Steen.	Scrophulariaceae	*Sporobolus diander* (Retz.) P. Beauv.	Poaceae
Scoparia dulcis Linn.	Scrophulariaceae	*Sporobolus tennuis* (Schrank) O. Kuntze	Poaceae
Veronica agrestis Linn.	Scrophulariaceae	*Sorghum nitidum* (Vahl.) Pers.	Poaceae
Veronica persica Poiret	Scrophulariaceae	*Vetiveria zizanioides* (Linn.) Nash.	Poaceae

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